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**(54) LAMINATED SHEET, ITS PRODUCTION, AND BACK SHEET OF DISPOSABLE DIAPER USING LAMINATED SHEET****(57)Abstract:**

**PROBLEM TO BE SOLVED:** To provide a laminated sheet having liquid impermeability and soft touch and suitable as a back sheet of a sanitary article such as a diaper or the like and to inexpensively and efficiently produce the laminated sheet.

**SOLUTION:** A laminated sheet obtained by laminating a thermoplastic resin layer and a nonwoven fabric layer is characterized by that the resin penetration ratio (P) of the thermoplastic resin layer into the nonwoven fabric layer represented by the formula  $P = \{(N+F-B)/P\} \times 100(\%)$  [wherein N is the thickness ( $\mu\text{m}$ ) of the nonwoven fabric layer before lamination, F is the thickness ( $\mu\text{m}$ ) of the thermoplastic resin sheet before lamination; and B is the thickness ( $\mu\text{m}$ ) of the laminated sheet after lamination] is 40% or less and adhesive strength is 10 g/25 mm or more. The resin of the thermoplastic resin layer is bonded to the nonwoven fabric layer under pressure by a roll while melted and extruded to perform extrusion lamination.

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CLAIMS

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[Claim(s)]

[Claim 1] The laminating sheet characterized by being the laminating sheet which comes to carry out the laminating of a thermoplastics layer and the nonwoven fabric layer, and for the resin permeability (P) to this nonwoven fabric layer of this thermoplastics layer expressed with a degree type (1) being 40% or less, and bond strength being 10g / 25mm or more.

$P = \{(N + F - B) / P\} \times 100 (\%) \dots (1)$

(N is the thickness (micrometer) of the nonwoven fabric layer in front of a laminating among a formula, F is the thickness (micrometer) of the thermoplastics layer in front of a laminating, and B is the thickness (micrometer) of the laminating sheet after a laminating.)

[Claim 2] The manufacture approach of the laminating sheet according to claim 1 which carries out roll sticking by pressure of the resin which makes a thermoplastics layer to a nonwoven fabric layer with melting extrusion, and is characterized by carrying out an extrusion lamination

[claim 3] The backseat of the disposable diaper using a laminating sheet according to claim 1

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**DETAILED DESCRIPTION**

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**[Detailed Description of the Invention]**

**[0001]**

**[Field of the Invention]** This invention relates to the laminating sheet preferably used as a backseat of sanitary goods, such as a disposable diaper, and its manufacture approach in detail about the laminating sheet which comes to carry out the laminating of a thermoplastics layer and the nonwoven fabric layer.

**[0002]**

**[Description of the Prior Art]** In sanitary goods, such as a diaper, although the resin product is widely used as the backseat, i.e., a sheet which serves as lateral surface in a product at the time of wearing, it is mentioned that it is liquid impermeability as engine performance required of this backseat as liquids, such as urine, do not leak, and that aesthetic property is still more softly good. In order to fill these, the laminating sheet of the sheet and nonwoven fabric which consist of liquid impermeable ingredients, such as thermoplasticity, has been used conventionally.

**[0003]** In this case, it considers as the approach of carrying out the laminating of the sheet which consists of a liquid impermeable ingredient, and the nonwoven fabric, and the following approach is usually used. Namely, (1) It is the approach of pasting up and carrying out the laminating of the liquid impermeable film and nonwoven fabric which consist of thermoplastics with superposition and hot melt system adhesives. Although soft aesthetic property is easily obtained from partial junction being possible according to this approach, there is a fault that the finishing machine of dedication is required and the cost of adhesives also requires it. Or (2) It is the approach of carrying out the laminating of the liquid impermeable film which consists of thermoplastics, and the nonwoven fabric sheet with a laminator. When the so-called flat roll which does not have irregularity as a roll side at the time of laminating in this approach is used, there is a problem that will be in the condition that the thermoplastics layer was laid under the nonwoven fabric layer since it will be joined completely, and the obtained laminating sheet becomes hard. Although what is necessary is just to use the embossing roll which has irregularity in making this problem solve, there is a fault that the disadvantage on facility that a special embossing roll's being needed and exchange with a flat roll are needed is large. Furthermore, (3) Although there was the so-called approach of the extrusion lamination which is made to carry out melting of the thermoplastics and carries out extrusion to a nonwoven fabric sheet, since it became complete junction also in this approach, there was a problem that soft aesthetic property was stabilized and was not obtained.

**[0004]** Then, an appearance of the manufacture approach of the sheet with which it is liquid impermeability and is satisfied of the engine performance required of the backseat which also said soft aesthetic property suddenly, and this sheet that can be mass-produced cheaply was desired.

**[0005]**

**[Problem(s) to be Solved by the Invention]** Under such a situation, this invention is liquid impermeability, and has soft aesthetic property, and offers a laminating sheet suitable as a backseat of sanitary goods, such as a diaper. Furthermore, the manufacture approach that this laminating sheet can be manufactured cheaply and efficiently is offered.

[0006]

[Means for Solving the Problem] this invention persons found out that said object could be attained in the laminating sheet which consists of a \*\*\*\* transparency layer which consists of thermoplastics which carried out melting extrusion, and a nonwoven fabric layer by joining so that the resin permeability to this nonwoven fabric layer of this thermoplastics layer may become the specific range, as a result of repeating research wholeheartedly. This invention is completed based on this knowledge.

[0007] That is, this invention offers the following laminating sheet and its manufacture approach, and the backseat of the disposable diaper using this laminating sheet further.

(1) The laminating sheet characterized by being the laminating sheet which comes to carry out the laminating of a thermoplastics layer and the nonwoven fabric layer, and for the resin permeability (P) to this nonwoven fabric layer of this thermoplastics layer expressed with a degree type (1) being 40% or less, and bond strength being 10g / 25mm or more.

[0008]

$$P = \{(N + F - B) / P\} \times 100 (\%) \dots (1)$$

(N is the thickness (micrometer) of the nonwoven fabric layer in front of a laminating among a formula, F is the thickness (micrometer) of the thermoplastics layer in front of a laminating, and B is the thickness (micrometer) of the laminating sheet after a laminating.)

(2) The manufacture approach of a laminating sheet given in the above (1) which carries out roll sticking by pressure of the resin which makes a thermoplastics layer to a nonwoven fabric layer with melting extrusion, and is characterized by carrying out an extrusion lamination.

(3) The backseat of the disposable diaper using a laminating sheet given in the above (1).

[0009]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained concretely.

1. In the thermoplastics layer which constitutes the laminating sheet concerning thermoplastics layer this invention, as resin used, if it is thermoplastics, there will be especially no limit and polyethylene (PE), polypropylene (PP), an ethylene-vinylacetate copolymer (EVA resin), etc. will be mentioned. Rigidity is preferably low and little low density polyethylene (LDPE) and straight chain-like low density polyethylene (LLDPE) of the sensibility used as the so-called umbrella umbrella are used. Furthermore, what blended elastomer resin, such as ethylene-propylene rubber, with these thermoplastics may be used.

[0010] As a consistency of the thermoplastics used, it is the point that softness is obtained to 0.940 g/cm<sup>3</sup>. In the following and a pan, they are 0.925 g/cm<sup>3</sup>. The following are desirable. As thickness of this thermoplastics layer, 5-40 micrometers is 8-25 micrometers preferably in the condition in front of a laminating. In less than 5 micrometers, there is a possibility that it may become difficult to obtain the stable thing of liquid impermeability industrially. If it exceeds 40 micrometers, it will become hard, and there is a possibility that the cloth's thing may not be obtained.

2. pass these bonding processes not to mention the product nonwoven fabric which passed through bonding processes, such as heat adhesion and junction by adhesives, in the nonwoven fabric which constitutes the laminating sheet concerning nonwoven fabric this invention — the so-called nonwoven web which is not is also contained. As fiber used, although there is especially no limit, polypropylene, polyethylene, polyethylene terephthalate (PET), a polyamide, polyurethane, cellulosic fibers, and these bicomponent fibers are used preferably. Polypropylene is used more preferably especially. There is especially no limit also in the manufacture approach of a nonwoven fabric, and it is suitably chosen from the approach by which flexibility and a bulk high feeling are obtained. Although it can manufacture by well-known approaches, such as span bond, a span ball race, a hot blast card, a heat enboss card, and a melt blow, what is depended on the following approach from points, such as reservation of permeability and softness, is used preferably especially. For example, the span bond method is suitable from that it can manufacture at one process, or excelling in hydrophobicity and being easy to obtain a soft thing with the bulk high. Moreover, eyes nonuniformity specifically has neither the bicomponent fiber of the span bond method and the melt blowing method, the thing compounded like the span bond

method / the melt blowing method / the span bond method nor the thing compounded like the span bond method / the melt blowing method, and an appearance is good and has the outstanding engine performance in which the concealment nature of liquids, such as urine, is high. Furthermore, what made the compound staple fiber (for example, polyethylene and polyethylene terephthalate) the shape of a sheet using the carding machine, and carried out heat welding by hot blast, heat embossing, etc. is soft, and it is desirable from the concealment nature of a liquid being high. The thing of a side-by-side mold or a sheath-core mold is also contained in this compound staple fiber.

[0011] although there is especially no limit also about the eyes of a nonwoven fabric — 10 – 40 g/m<sup>2</sup> — desirable — 15 – 25 g/m<sup>2</sup> it is . 40 g/m<sup>2</sup> When it exceeds, the nonwoven fabric itself becomes thick, and there is a possibility of becoming that which is not soft, and they are 10 g/m<sup>2</sup>. In being the following, there is a problem that the thing of the quality stabilized industrially is hard to be obtained. As thickness of this nonwoven fabric layer, although it changes with eyes, it sets in the condition in front of a laminating, and eyes are 10 – 40 g/m<sup>2</sup>. It sets in the range and 0.10–0.70mm and eyes are 5 – 25 g/m<sup>2</sup>. In the range, 0.15–0.30mm is desirable.

3. Laminating sheet (1) The laminating sheet concerning this invention is a laminating sheet which comes to carry out the laminating of said thermoplastics layer and said nonwoven fabric layer, and the resin permeability (P) to this nonwoven fabric layer of this thermoplastics layer expressed with a degree type (1) is 25% or less preferably 40% or less.

[0012]

$$P = [(N + F - B) / P] \times 100 (\%) \dots (1)$$

(N is the thickness (micrometer) of the nonwoven fabric layer in front of a laminating among a formula, F is the thickness (micrometer) of the thermoplastics layer in front of a laminating, and B is the thickness (micrometer) of the laminating sheet after a laminating.) When this resin permeability (P) exceeds 40%, there is a possibility that the amount of the thermoplastics which enters to a nonwoven fabric layer may increase, and the sheet itself may become hard.

[0013] (2) Bond strength is still more nearly required for 10g / being 20g / 25mm or more preferably 25mm or more. There is a possibility of in the case of 10g / less than 25mm exfoliating easily, two-layer dissociating while in use, and there being a possibility that it may become impossible to secure the function as the cloth's sheet, and generating a shaping trouble at the time of a fabricating operation.

4. As the manufacture approach of the laminating sheet concerning manufacture approach this invention of a laminating sheet, although there is especially no limit, the so-called extrusion laminating method which carries out roll sticking by pressure of the resin which makes a thermoplastics layer to a nonwoven fabric layer with melting extrusion is used preferably. By using this approach, it becomes more possible to manufacture the soft cloth's laminating sheet cheaply.

[0014] In this approach, the above-mentioned resin permeability (P) can be satisfied by choosing suitably resin temperature or the roll sticking-by-pressure force. If resin temperature or the roll sticking-by-pressure force is lowered, the permeability to the nonwoven fabric layer of thermoplastics will fall, and, specifically, aesthetic property will become soft. However, bond strength falls in this case. As a roll to be used, the so-called flat roll which does not have irregularity in a roll side can be used.

5. Although using for various applications is possible, the laminating sheet concerning backseat this invention of the disposable diaper using said laminating sheet is divided, and is used suitable for the backseat of the disposable diaper with which liquid impermeability and the cloth's soft aesthetic property are demanded.

[0015]

[Example] Next, this invention is not limited by these examples although an example explains this invention in more detail. Assessment of the description of the obtained laminating sheet was performed by the approach shown below.

[0016] \*\* Thickness: Circuit tester industrial company make and the thickness gage for fiber are used, and it is JIS. It is based on L1906 and is load 10 g/cm<sup>2</sup>. It carried out on conditions.

\*\* Flexibility: The pure-bending trial was performed using the KES-FBby KATO tech company 2

mold machine. It is shown that it is so soft that a value is small.

**\*\* Aesthetic property:** Six persons' circuit tester performed organic-functions assessment by the hand. There is a bulk high feeling and four steps of OO\*\*x were evaluated for whether it is softly close to the cloth.

[0017] **\*\* Peel strength:** The friction test to a lengthwise direction was performed for the speed of testing in a part for 300mm/about the test piece with a width of face of 25mm using the product made from Instron, and the 4301 mold tension tester.

[Example 1] It is straight chain-like low density polyethylene (LLDPE) (it is a nonwoven fabric (the extrusion lamination was carried out to the polypropylene staple fiber card heat embossing nonwoven fabric and trade name made from FUKURON "D-01520" (eyes 20 g/m<sup>2</sup>.) with melting extrusion with a T-die making machine about Idemitsu petrochemical company make and a trade name "MOATEKKU 1018D" (consistency 0.911 g/cm<sup>3</sup>, 10 MI=8.0g /, minutes)) as thermoplastics.

[0018] The processing conditions are as follows.

**\*\* Extrusion temperature:** 270 degree-C**\*\* extrusion outlet :** 150 kg/h**\*\* taking over rate:** A part for 80m/(it adjusted so that thickness might be set to 10\*\*2 micrometers.)

**\*\* Sticking-by-pressure roll pressure:** It carried out by 1.0kg/cm<sup>2</sup> (cage \*\*).

Moreover, the description of the obtained laminating sheet is shown in the 1st table.

[0019]

[A table 1]

第 1 表

	不織布の 厚み(μm) (N)	樹脂層の 厚み(μm) (F)	積層シートの 厚み(μm) (B)	樹脂浸透率 (%) (P)	押出温度 (°C)	ロール圧 (kg/cm <sup>2</sup> )	純曲げ試験 (gf/cm/cm)	風合い	剥離強度 (g/25mm)
実施例 1	160	15	164	6	270	1.0	$1.6 \times 10^{-2}$	◎	95
実施例 2	160	15	157	10	270	3.0	$2.5 \times 10^{-2}$	○	140
実施例 3	195	15	175	17	270	3.0	$3.1 \times 10^{-2}$	△	220
比較例 1	160	15	99	43	305	5.0	$15.3 \times 10^{-2}$	×	材料破壊
比較例 2	160	15	173	1	203	0.1	$1.3 \times 10^{-2}$	◎	4
比較例 3	195	15	110	48	305	5.0	$22.6 \times 10^{-2}$	×	材料破壊

[0020] [Example 2] In the example 1, it carried out like the example 1 except having performed sticking-by-pressure roll pressure by 3.0kg/cm<sup>2</sup> (cage \*\*). The description of the obtained laminating sheet is shown in the 1st table.

[Example 3] It sets in the example 2 and is a polypropylene span bond nonwoven fabric (it carried out like the example 2 except having replaced with Idemitsu petrochemical company make and a trade name "SUTORA tech RW2020" (eyes 20 g/m<sup>2</sup>).) about a nonwoven fabric.

[0021] The description of the obtained laminating sheet is shown in the 1st table.

[Example 1 of a comparison] In the example 1, it carried out like the example 1 except having performed extrusion temperature at 305 degrees C, and having performed sticking-by-pressure roll pressure by 5.0kg/cm<sup>2</sup> (cage \*\*). The description of the obtained laminating sheet is shown in the 1st table.

[Example 2 of a comparison] In the example 1, it carried out like the example 1 except having performed extrusion temperature at 203 degrees C, and having performed sticking-by-pressure roll pressure by 0.1kg/cm<sup>2</sup> (cage \*\*).

[0022] The description of the obtained laminating sheet is shown in the 1st table.

[Example 3 of a comparison] It sets for the example 1 of a comparison, and is a polypropylene

span bond nonwoven fabric (it carried out like the example 1 of a comparison except having replaced with Idemitsu petrochemical company make and a trade name "SUTORA tech RW2020" (eyes 20 g/m2).) about a nonwoven fabric.

[0023] The description of the obtained laminating sheet is shown in the 1st table.

[0024]

[Effect of the Invention] The laminating sheet of this invention has good moisture permeability and soft aesthetic property, and is suitable as a backseat of sanitary goods, such as a diaper. Moreover, this laminating sheet can be manufactured cheaply and efficiently by the manufacture approach of the laminating sheet of this invention.

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